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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/416,081	10/12/1999	IIYA M. FISHMAN	99-01-US	5691

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OPTIMIGHT COMMUNICATIONS, INC
2712 ORCHARD PARKWAY
SAN JOSE, CA 95134

EXAMINER	
SEDIGHIAN, REZA	
ART UNIT	PAPER NUMBER
2633	

DATE MAILED: 02/22/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

NM

Office Action Summary	Application No.	Applicant(s)	
	09/416,081	FISHMAN ET AL.	
	Examiner	Art Unit	
	Mohammad R Sedighian	2633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 October 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4, 6-17 and 22-34* is/are rejected.

7)☒ Claim(s) *5, 18-21* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 October 1999* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☒ The proposed drawing correction filed on *27 October 2001* is: a)☒ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

1. This communication is responsive to applicant's 10/27/01 amendment in the application of Fishman et al. for "Multichannel Optical Communication System and Method Utilizing Wavelength and Coherence Division Multiplexing" filed 10/12/99. The amendments have been entered. Claims 1-34 are now pending.

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, " a reference arm disposed within a reference path", and " an optical delay line that comprises a temperature sensitive component, wherein the temperature sensitive component is a temperature compensating device" must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-2, 12-13, 22, and 29-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe (US patent No: 5,896,211).

Regarding claims 1, 22, and 32-34, Watanabe discloses a multichannel optical communication system (fig. 4) for transmitting optical signals via an optical fiber (col. 4, lines

31-60 and 34, fig. 4), comprising: a plurality of individual WDM transmission channels (A1, A2, fig. 4) each transmitting a WDM optical signal on a unique wavelength (f_{s1}, f_{s2}, fig. 4) within a designated bandwidth (col. 4, lines 52-67); a CDM transmission unit (col. 5, lines 17-20, col. 7, lines 7-13 and An, fig. 4) that is comprised of a transmission channel (f_{sn}, fig. 4).Watanabe differs from the claimed invention in that Watanabe does not specifically disclose the CDM transmission unit is disposed within at least one individual WDM transmission channel, and the CDM transmission unit transmits CDM optical signals within the designated bandwidth of one individual WDM transmission channel. However, Watanabe discloses a method of coherent wavelength division multiplexing (col. 6, lines 17-22), wherein a plurality of different optical signals (f_{s1}, f_{s2}, ..., f_{sn}, fig. 4) are generated (col. 4, lines 31-50 and 31, 32, 33, fig. 4) that are representing different data channels (D1, D2, Dk, fig. 4). Therefore, it would have been obvious to an artisan at the time of invention to incorporate an optical transmission system and method such as the one of Watanabe to provide a CDM transmission unit within one individual WDM transmission channel such as the one of Watanabe in order to provide a high density multiplex transmission system for exchanging a large capacity of information. As to claims 33-34, Watanabe discloses a coherent optical frequency division multiplex communication system (col. 6, lines 19-20) for transmitting optical signals therethrough within a designated range of wavelengths of each transmission channel (col. 4, line 60).

Regarding claim 2, Watanabe further discloses single frequency optical sources (col. 4, lines 59-60 and 33, fig. 4) for each WDM transmission channels (f_{s1}, f_{s2}, fig. 4) and a broadband optical source (col. 7, lines 7-9 and 33, fig. 4) for generating light for CDM optical signals (f_{sn}, fig. 4).

Regarding claim 12, Watanabe further discloses a WDM multiplexer (38, fig. 4), an optical fiber link (34, figs. 4, 12), a WDM demultiplexer (81, fig. 12), and a plurality of optical receivers (83-1, 83-2, 83-k, fig. 12).

Regarding claim 13, Watanabe further discloses the receiving system comprises of a splitter (81, fig. 12), one or more optical filters (82-1, 82-2, fig. 12), and one or more optical detectors (83-1, 83-2, fig. 12).

Regarding claim 29, Watannabe discloses a multichannel optical communication system (fig. 4) with a plurality of WDM transmission units (A1, A2, ..., An, fig. 4), each having a transmitter (33, fig. 4) and a receiver (35, fig. 4 and 83, fig. 12), selecting (31, 32, fig. 4) one transmission channel out of the plurality of WDM transmission channels (D1, D2,..., Dk, fig. 4), substituting the transmitter and receiver with a plurality of CDM transmission channels (col. 5, lines 8-16), and generating a light beam (33, fig. 4) by a broadband source for CDM optical signals (col. 7, lines 7-9). Claim 29 further requires similar limitations as recited in claim 1.

Regarding claim 30, Watanabe further discloses extracting the plurality of CDM transmission channels for detecting the optical signals (col. 11, lines 3-13).

Regarding claim 31, Watanabe further discloses a spectrum of the light beam has a spectral range within a transparency range of the optical fiber (col. 1, lines 17-23).

5. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe (US patent No: 5,896,211) in view of Takara, H. Kawanishi et al. (Electronics Letters 7th July 1994 vol. 30 No.14).

Regarding claim 3, Watanabe differs from the claimed invention in that Watanabe does not disclose the broadband optical source comprises of a seed source, an optical filter, an erbium-doped fiber amplifier, and a semiconductor optical amplifier. Takara, H. Kawanishi discloses a signal source that is comprised of a laser source (ML-EDF, fig. 1), an optical filter (BPF, fig. 1), a first erbium-doped fiber amplifier (EDFA4, fig. 1), and a second erbium-doped fiber amplifier (EDFA5, fig. 1). Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to incorporate an optical source, an optical filter, and erbium-doped fiber amplifiers such as the one used in the signal source of Kawanishi for the optical source in transmission system of Watanabe in order provide a desired selection for the spectral range of light transmitter and to improve the transmission characteristics by amplifying the signal light for further signal transmission and processing.

6. Claims 4 and 6-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe (US patent No: 5,896,211) in view of Koren et al. (US patent No: 5,861,965).

Regarding claim 4, Watanabe differs from the claimed invention in that Watanabe does not specifically disclose the broadband optical source has a discrete spectrum with equally spaced individual spectral lines. Koren discloses a multi-wavelength communication system (fig. 3), wherein the system employs a spectrally sliced (fig. 2A) broadband spectrum (col. 1, lines 5-10, col. 3, lines 1-14, 24-28) optical source (18, fig. 3). Therefore, it would have been obvious to an artisan at the time of invention to incorporate a spectrally sliced broadband optical source such as the one of Koren for the broadband optical source in the optical transmission unit of

Watanabe in order to provide repetitive signals and multiple frequencies for each transmission channel.

Regarding claim 6, Koren further discloses the optical source is a laser (col. 3, lines 55-59) modulated at frequency f_0 (col. 4, lines 1-3).

Regarding claim 7, Watanabe discloses the optical source (33, fig. 4) is a plurality of lasers (col. 7, lines 7-9) each tuned and fixed at respective wavelength (col. 4, lines 58-60).

7. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe (US patent No: 5,896,211) in view of Burns et al. (US patent No: 5,917,970).

Regarding claim 8, Watanabe differs from the claimed invention in that Watanabe does not disclose the CDM transmission unit further comprises of a light splitter, a phase modulator, a reference path, a reference arm, and a combiner. Burns discloses an optical wavelength multiplex transmission system (col. 1, lines 39-45), wherein coherent optical signals of different wavelengths (col. 2, lines 15-30) are splitted (16, fig. 1) and passed through a reference path (22a, 22b, fig. 1), and a reference arm (28, 32, 34, 36, figs. 1, 2a) and further phase modulated (36, figs. 1, 2a), delayed (48, fig. 1), and combined (col. 1, lines 40-67, col. 2, lines 30-67, col. 3, lines 35-67, col. 4, lines 1-2 and 53, fig. 1). Therefore, it would have been obvious to a person of ordinary skill in the art to incorporate a method of coherent wavelength division multiplexing and phase modulation such as the one of Burns for the optical transmission and phase modulation unit of Watanabe to provide a plurality of phase adjusted optical signals that are multiplexed to form a single phase adjusted optical signal for further transmission over an optical fiber.

8. Claims 23 and 27are rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe (US patent No: 5,896,211) in view of Smith (US patent No: 4,959,826).

Regarding claims 23 and 27, Watanabe further discloses generating light beam by a single frequency optical source (33, fig. 4) within each individual WDM transmission channel (f_{s1}, f_{s2}, fig. 4), generating light beam (33, fig. 4) for transmitting CDM optical signals (f_{sn}, fig. 4) by a broadband optical source (col. 7, lines 7-13), multiplexing the optical signals (38, fig. 4), transmitting the optical signals via an optical link (34, fig. 4), demultiplexing (81, fig. 12) the signal into individual signals (81, 82, fig. 12), and detecting the optical signals (col. 11, lines 6-13 and 83, fig. 12). Watanabe differs from the claimed invention in that Watanabe does not disclose modulating and phase delaying the CDM optical signals. Smith discloses an optical coherent transmission system (col. 6, lines 12-15, fig. 1), wherein a laser source (1, fig. 1) generate a spread spectrum optical signal (2, fig. 1) that is further divided (3, fig. 1), phase modulated (M, fig. 1) and delayed (t_1, t_2, t_3, fig. 1). Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to incorporate a method of coherent optical transmission and phase modulation such as the one of Smith for the optical transmission and modulation units of Watanabe in order to phase modulate and delaying the optical signals by passing through an associated optical delay lines of predetermined delay to further provide a plurality of phase adjusted optical signals that are wavelength multiplexed to form a single phase adjusted optical signal for further transmission over an optical fiber. As to claim 27, it further requires similar limitations as recited in claim 1 above.

9. Claims 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe (US patent No: 5,896,211) in view of Burns et al. (US patent No: 6,185,345), and in further view of Das et al. (US patent No: 5,703,708).

Regarding claims 9-10, the combination of Watanabe and Burns further differs from the claimed invention in that Watanabe and Burns do not disclose the optical delay line comprises of a temperature sensitive component. Das discloses an adjustable optical delay line (VL1, VL2, fig. 2), wherein the optical delay line (col. 2, lines 38-45, 67) comprises a temperature sensitive component (HK, fig. 1). Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to incorporate an optical delay line with temperature sensitive component such as the one of Das for the optical delay lines in the modified optical transmission system of Watanabe and Burns in order to provide a delay that is controllable and adjustable for different data rates given optimally low attenuation.

Regarding claim 11, Burns further discloses the phase modulator and the reference arm are integrated on a single lithium niobate chip (col. 3, lines 42-51).

10. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe (US patent No: 5,896,211) in view of Smith (US patent No: 4,959,826), or Burns et al. (US patent No: 6,185,345), and in further view of Das et al. (US patent No: 5,703,708).

Regarding claim 14, Watanabe discloses a multichannel (f_{s1}, f_{s2}, ..., f_{sn}, fig. 4) optical fiber communication system for transmitting CDM optical signals (col. 7, lines 7-13) via at least one WDM transmission channel (f_{s1}, fig. 4), comprising: a first plurality of individual WDM transmission channels (f_{s1}, f_{s2}, fig. 4), and one CDM transmission unit (An, fig. 4) disposed

within one individual WDM transmission channel (col. 3, lines 24-36, col. 4, lines 52-60) . Watanabe differs from the claimed invention in that Watanabe does not disclose the CDM unit comprising of a second plurality of CDM transmission channels, and a light splitter for dividing the light signals into a reference path and a number of paths. Smith discloses an optical coherent transmission system (col. 6, lines 12-15, fig. 1), wherein a laser source (1, fig. 1) generate a spread spectrum optical signal (2, fig. 1) that is divided (3, fig. 1) into a reference path (5, fig. 1) and a number of paths (4, fig. 1), and further phase modulated (M, fig. 1) and delayed by the delay lines (t_1, t_2, t_3, fig. 1). Burns discloses a coherent optical transmission system (col. 2, lines 15-30), wherein a plurality of different optical signals are splitted (16, fig. 1) and passed through a reference path (22a, 22b, fig. 1), and another path (28, 32, 34, 36, figs. 1, 2a) and further phase modulated (36, figs. 1, 2a), delayed (48, fig. 1), and combined (col. 1, lines 40-67, col. 2, lines 30-67, col. 3, lines 35-67, col. 4, lines 1-2 and 53, fig. 1). Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to incorporate a method of coherent optical transmission and phase modulation such as the one of Smith or Burns for the optical transmission and modulation units of Watanabe to provide a plurality of phase adjusted optical signals that are multiplexed to form a single phase adjusted optical signal for further transmission over an optical fiber. The combination of Watanabe and Smith, or Burns further differs from the claimed invention in that Watanabe and Smith, or Burns do not disclose the optical delay line comprises of a temperature sensitive component. Das discloses an adjustable optical delay line (VL1, VL2, fig. 2), wherein the optical delay line (col. 2, lines 38-45, col. 2, lines 67) comprises a temperature sensitive component (HK, fig. 1). Therefore, it would have been obvious to artisan at the time of invention to incorporate an optical delay line with

temperature sensitive component such as the one of Das for the optical delay lines in the modified optical transmission system of Watanabe and Smith, or Burns in order to provide a delay that is controllable and adjustable for different data rates given optimally low attenuation.

11. Claims 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe (US patent No: 5,896,211) in view of Smith (US patent No: 4,959,826) and in further view of Das et al. (US patent No: 5,703,708).

Regarding claim 24, the combination of Watanabe and Smith further differs from the claimed invention in that the combination of Watanabe and Smith do not disclose the optical delay line comprises of a temperature sensitive component. Das discloses an adjustable optical delay line (VL1, VL2, fig. 2), wherein the optical delay line (col. 2, lines 38-45, col. 2, lines 67) comprises a temperature sensitive component (HK, fig. 1). Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to incorporate an optical delay line with temperature sensitive component such as the one of Das for the optical delay lines in the modified optical multiplex transmission system of Watanabe and Smith in order to provide a delay that is controllable and adjustable for different data rates given optimally low attenuation.

Regarding claim 25, Watanabe further discloses extracting the plurality of CDM transmission channels for detecting the optical signals (col. 11, lines 6-13).

Regarding claim 26, Watanabe further discloses a spectrum of the light beam has a spectral range within a transparency range of the optical fiber (col. 1, lines 17-22).

12. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe (US patent No: 5,896,211) in view of Smith (US patent No: 4,959,826) and in further view of Koren et al. (US patent No: 5,861,965).

Regarding claim 28, the combination of Watanabe and Smith further differs from the claimed invention in that Watanabe and Smith do not specifically disclose the optical source has a discrete spectrum with equally spaced individual spectral lines. Koren discloses a multi-wavelength communication system (fig. 3), wherein the system employs a spectrally sliced (fig. 2A) broadband spectrum (col. 1, lines 5-10, col. 3, lines 1-14, 24-28) optical source (18, fig. 3). Therefore, it would have been obvious to an artisan at the time of invention to incorporate a spectrally sliced broadband optical source such as the one of Koren for the broadband optical source in the modified optical transmission unit of Watanabe and Smith in order to provide repetitive signals and multiple frequencies for each transmission channel.

13. Claims 15 and 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe (US patent No: 5,896,211) in view of Smith (US patent No: 4,959,826), or Burns et al. (US patent No: 6,185,345), and in view of Das et al. (US patent No: 5,703,708), and in further view of Koren et al. (US patent No: 5,861,965).

Regarding claim 15, the modified communication system of Watanabe, Smith or Burns, and Das further differs from the claimed invention in that Watanabe, Smith or Burns, and Das do not specifically disclose the broadband optical source has a discrete spectrum with equally spaced individual spectral lines. Koren discloses a multi-wavelength communication system (fig. 3), wherein the system employs a spectrally sliced (fig. 2A) broadband spectrum (col. 1, lines 5-

10, col. 3, lines 1-14, 24-28) optical source (18, fig. 3). Therefore, it would have been obvious to an artisan at the time of invention to incorporate a spectrally sliced broadband optical source such as the one of Koren for the broadband optical source in the modified optical transmission unit of Watanabe, Smith or Burns, and Das in order to provide repetitive signals and multiple frequencies for each transmission channel.

Regarding claim 17, Burns discloses the CDM transmission unit comprises a common reference arm (col. 3, lines 35-47 and 22, fig. 1).

14. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe (US patent No: 5,896,211) in view of Smith (US patent No: 4,959,826), or Burns et al. (US patent No: 6,185,345), and Das et al. (US patent No: 5,703,708) in further view of Takara, H. Kawanishi et al. (Electronics Letters 7th July 1994 vol. 30 No.14).

Regarding claim 16, the combination of Watanabe, Smith or Burns, and Das further differs from the claimed invention in that Watanabe, Smith or Burns, and Das do not disclose the broadband optical source comprises of a seed source, an optical filter, an erbium-doped fiber amplifier, and a semiconductor optical amplifier. Takara, H. Kawanishi discloses an signal source that is comprised of a laser source (ML-EDF, fig. 1), an optical filter (BPF, fig. 1), a first erbium-doped fiber amplifier (EDFA4, fig. 1), and a second erbium-doped fiber amplifier (EDFA5, fig. 1). Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to incorporate an optical source, an optical filter, and erbium-doped fiber amplifiers such as the one used in the signal source of Kawanishi for the optical source in the modified optical transmission system of Watanabe, Smith or Burns, and Das in order provide a

desired selection for the spectral range of light transmitter and to improve the transmission characteristics by amplifying the signal light for further signal transmission and processing.

15. Claims 5 and 18-21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

16. Applicant's arguments with respect to claims 1, 14, 22, 27, 29 and 32 have been considered but are moot in view of the new ground(s) of rejection.

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mohammad R Sedighian whose telephone number is (703) 308-9063. The examiner can normally be reached on M-F (from 9 AM to 5 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (703) 305-4729. The fax phone numbers for the organization where this application or proceeding is assigned is (703) 872-9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4700.

Leslie Pascal
LESLIE PASCAL
PRIMARY EXAMINER